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(54) PROJECTION SCREEN

(57)Abstract:

PURPOSE: To obtain a projection screen with which a black level can be obtd. under usual illumination by forming a laminated structure of a visible ray absorbing layer, filter which selectively reflects a red color region, filter which selectively reflects a green color region, and filter which selectively reflects a blue color region.

CONSTITUTION: This projection screen is constituted by successively laminating a visible ray absorbing layer 2, filter 3 which selectively reflects red color region, filter 4 which selectively reflects green color region, and filter 5 which selectively reflects blue color region on a supporting body 1. When an image of a liquid crystal projector having 450nm center wavelength of blue projection light, 550nm center wavelength of green projection light, and 650nm center wavelength of red projection light is projected on this screen, the obtd. image shows a sufficient black level.

Further, even when an image of a liquid crystal projector is projected on this screen in a rather bright room with fluorescent lamps turned on, a bright image with high contrast can be obtd. without rising of an image with the black level.

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## CLAIMS

[Claim(s)]

[Claim 1] The projection screen characterized by coming to carry out the laminating of a light absorption layer, the filter which reflects a red field selectively, the filter which reflects a green field selectively, and the filter which reflects a blue field selectively on a base material.

[Claim 2] The projection screen according to claim 1 characterized by a polarizing filter coming to carry out a laminating on said filter.

## DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the projection screen of the reflective mold used combining the projector using liquid crystal etc.

[0002]

[Description of the Prior Art] In the conventional projection screen, what was [ as / show / in drawing 3 ] made from the base material which has an aluminum front face, and made this front face various configurations is known. For example, that in which the indirectional detailed concavo-convex pattern by the liquefied honing process was formed, the thing in which the detailed directivity irregularity pattern by rolling of a foil

comrade was formed, and the thing in which the crater of a detailed directivity irregularity pattern and a large number given on it was formed are proposed.

[0003] Moreover, the screen which the detailed glass bead 8 was clustered in the whole surface of a reflecting layer 9, and applied it as shown in drawing 4 is also known.

[0004]

[Problem(s) to be Solved by the Invention] However, since scattered reflection of the projection light which carried out outgoing radiation from the projector in the above-mentioned conventional projection screen is carried out in a reflector, when outdoor daylight exists, scattered reflection also of this outdoor daylight is carried out on a screen, and the contrast of the image on a screen falls. Therefore, it had the technical problem that a perimeter is usually made dark, the incidence to the screen of outdoor daylight had to be controlled, or directivity had to be given.

[0005] Moreover, if it is going to acquire sufficient contrast by force under the usual lighting, in order to have to make it the reflected light brightness by outdoor daylight have to serve as black level of an image and to project the image of a white level, the light source needed to be made very bright and it also had the technical problem that the sensibility seen while it was useless in power became very unnatural.

[0006] This invention is made in order to solve the conventional technical problem mentioned above, and even if it is under the usual lighting, it aims at offering the projection screen with which black level is obtained.

[0007]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, it was characterized by coming to carry out the laminating of a light absorption layer, the filter which reflects a red field selectively, the filter which reflects a green field selectively, and the filter which reflects a blue field selectively on a base material in the projection screen of this invention.

[0008] Moreover, it was characterized by a polarizing filter coming to carry out a laminating on said filter.

[0009]

[Function] The principle of the projection screen constituted as mentioned above is explained using the principle explanatory view of this invention of drawing 5 . the inside of drawing, and 1 -- a base material and 2 -- a light absorption layer and 3 -- a red selective reflection filter and 4 -- for projection light and 11, as for green projection light and 13, blue projection light and 12 are [ a green selective reflection filter and 5 / a blue selective reflection filter and 10 / red projection light and 14 ] outdoor daylight.

[0010] The projection light 10 which carries out outgoing radiation from a projector

consists of the blue projection light 11 of a specific wavelength field, the green projection light 12, and the red projection light 13. The blue selective reflection filter 5 reflects selectively only the projection light of the wavelength field of the blue projection light 11, and the light of other wavelength fields has the property of penetrating. Similarly, the red selective reflection filter 3 and the green selective reflection filter 4 reflect the projection light of each wavelength field similarly, and the remainder penetrates them.

[0011] Therefore, since only the projection light of red and each green and blue wavelength field which carries out outgoing radiation from a projector is reflected, light other than each wavelength field included in outdoor daylight 14 etc. is absorbed by the ** visible optical absorption layer 2 and it does not reflect, sufficient black level is obtained. Moreover, since only the polarization component which carries out outgoing radiation is penetrated and it can lead to each reflective filter from a projector by carrying out the laminating of the polarizing filter, black level can be obtained further.

[0012]

[Example] Below, the example of this invention is explained based on a drawing.

(Example 1) Drawing 1 is the configuration sectional view of the projection screen of this invention. In drawing 1 , 1 is a base material. Soda glass, glass fabrics, etc. are mentioned as a base material 1. 2 is a light absorption layer. The black plate dyed and finished black as a light absorption layer 2 so that it might have absorption in a methacryl resin in a light field was used. Here, the high polymer film dyed black as a light absorption layer may be stuck, and black ink etc. may be formed by the approach of applying to a base material directly. Moreover, when a base material is light transmission nature, a light absorption layer may be formed in the tooth back of a base material. Moreover, a base material 1 is black, and when absorbing the light, it is also possible to omit a light absorption layer. 3 is a filter which reflects a red field selectively. Such a filter is obtained by carrying out the laminating of the thin film which has a low refractive index, and the thin film which has a high refractive index by turns on quarter-wave length conditions using the membrane formation approaches, such as vacuum evaporationo and a spatter.

[0013] In the main wavelength 650nm**20nm wavelength field, the reflection factor obtained [ the reflection factor ] 10% or less of red selective reflection filter 3 [ except main wavelength / of 650nm /**50nm ] at 80% or more, using diacid-ized titanium as a thin film which has diacid-ized silicon and a high refractive index as a thin film which has a low refractive index in this invention. Next, it sets to a main wavelength 550nm**20nm wavelength field using the same membrane formation approach as on

the red selective reflection filter 3. A reflection factor sets [ a reflection factor ] [ except main wavelength / of 550nm /**50nm ] to 10% or less of green selective reflection filter 4, and a main wavelength 450nm**20nm wavelength field at 80% or more. The reflection factor carried out [ the reflection factor ] the laminating of 10% or less of the blue selective reflection filter 5 to order [ except main wavelength / of 450nm /**50nm ] at 80% or more. The sequence which carries out the laminating of the selective reflection filters 3, 4, and 5 of each color is not restricted to this here.

[0014] Moreover, although the direct laminating of the selective reflection filter of each color was carried out to order in this example, the selective reflection filter of each color is independently formed on a transparent base material, and with transparent adhesives etc., they are stuck and may carry out a laminating. Thus, spectrum drawing of the reflection property of the obtained projection screen is shown in drawing 6 .

[0015] Thus, when the main wavelength of blue projection light projected and observed the liquid crystal projector whose main wavelength of 550nm and red projection light the main wavelength of 450nm and green projection light is 650nm on the obtained projection screen, the image of sufficient black level was obtained and the contrast on a screen was also dramatically high.

[0016] Moreover, when the image of a liquid crystal projector was projected and observed on the projection screen of this invention in the comparatively bright interior of a room which the fluorescent lamp has turned on, since the image of black level did not float, the image with the contrast bright high moreover on a screen was obtained.

(Example 2) Drawing 2 is the sectional view of the 2nd example of this invention. The example 2 produced the projection screen like the example 1, and made the base material 1 the configuration which carried out the laminating of the polarizing filter 6 on the surface of the opposite hand. The polarizing plate which laminated the cellulose type film was used for the both sides of the polarizer extended after making the polyvinyl alcohol film of a base material absorb the iodation compound and direct dye which are the dichroic matter as a polarizing filter 9 here. When carrying out a laminating, the laminating was carried out using the binder so that the polarization shaft of the projection light of a liquid crystal projector and the transparency shaft of the polarization film 6 to be used might be parallel.

[0017] Thus, when the main wavelength with a polarization shaft parallel to a transparency shaft of blue projection light projected the liquid crystal projector whose main wavelength of 550nm and red projection light the main wavelength of 450nm and green projection light is 650nm and observed on the polarization film at the obtained projection screen, from the example 1, the image of still better black level was obtained

and the contrast on a screen also became very high.

[0018]

[Effect of the Invention] As explained above, since the projection screen of this invention was considered as the configuration which carried out the laminating of a light absorption layer, the filter which reflects a red field selectively, the filter which reflects a green field selectively, and the filter which reflects a blue field selectively on the base material, it has the effectiveness indicated below.

[0019] (1) Also in a bright environmental condition in which outdoor daylight exists, since the contrast on sufficient black level and a high screen can be acquired, a clear projection image can be obtained, without choosing the operating environment of a projection screen and a liquid crystal projector.

(2) Since sufficient black level is obtained and the too bright projector light source becomes unnecessary, sensibility which power consumption of a liquid crystal projector could be lessened, and looked at it can be made natural.

## DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the configuration sectional view of the example 1 of this invention.

[Drawing 2] It is the configuration sectional view of the example 2 of this invention.

[Drawing 3] It is the explanatory view having shown the configuration sectional view of an example of the conventional projection screen.

[Drawing 4] It is the explanatory view having shown the configuration sectional view of

other examples of the conventional projection screen.

[Drawing 5] It is an explanatory view explaining the principle of this invention.

[Drawing 6] It is drawing having shown the spectrum of the reflection property of the projection screen of this invention.

[Description of Notations]

1 Base Material

2 Light Absorption Layer

3 Red Selective Reflection Filter

4 Green Selective Reflection Filter

5 Blue Selective Reflection Filter

6 Polarizing Filter

7 Concavo-convex Side

8 Glass Bead

9 Reflecting Layer

10 Projection ****

11 Blue Projection Light

12 Red Projection Light

13 Green Projection

14 Outdoor Daylight